1901MNRAS..61..386M

of about 20,000 titles of astronomical works made by the late Mr. G. J. Symons, presented by his executors; The Cape Photographic Durchmusterung, part 3, and Researches on Stellar Parallax, presented by the Royal Observatory, Cape of Good Hope; Sir W. Hamilton, Elements of Quaternions, vol. ii., second edition, edited by C. J. Joly, presented by the Editor; Photograph of the Solar Eclipse of May 1900, by Professor E. E. Barnard, presented by Professor Barnard and Mr. Ritchey; photograph of the cluster in *Hercules* and of a portion of the Moon, made with the 40-inch telescope of the Yerkes Observatory, presented by Professor G. E. Hale; a siderostat by Hilger, presented by Mr. Alex. Foote.

Second Note on Photographs of the Spectrum of Nova Persei; Correspondence with the Spectrum of η Argûs. By F. McClean, LL.D., F.R.S.

The complete list of photographs of the spectrum of *Nova Persei* obtained by me between February 25 and April 9 is as follows. The magnitudes were approximately estimated from neighbouring stars:—

1901.	Mag.		1901.	Mag.	
Feb. 25	1	visual spectrum observed	March 18	4	2 photographs
			22	4½	1 ,,
27	1¼	2 photographs	24	5	2 ,,
28	1½	2 ,,	27	4¼	2 ,,
March 1	2	3 ,,	31	4½	1 ,,
2	2	1 ,,	April 1	4¼	nil ,,
3	2½	3 ,,	4	4½	1 ,,
5	2½	1 ,,	5	4½	2 ,,
6	3¼	1 ,,	7	5½	1 ,,
9	4	3 ,,	8	4¼	nil ,,
12	4½	2 ,,	9	4½	1 ,,

Making in all 31 photographs taken on 18 nights.

These photographs have been enlarged for comparison. Four of them have been selected and mounted together with an approximate scale of wave lengths (plate No. 1, shown at Meeting).

These were taken on the following dates: February 27, March 3 and 12, and April 5. The hydrogen absorption lines were clearly shown on the photographs up to March 18. On March 22 and subsequently they could not be distinguished.

1901MNRAS..61..386M

Lantern slides of the same four spectra were also shown. The two earlier ones show the extent of the spectrum photographed from ($H\iota$) to near (D).

The spectra shown by me on March 8 were accompanied by a comparison spectrum of β *Crucis* in order to show the apparent absence of the Helium lines. They were also accompanied by a comparison spectrum of *Sirius* to show the strong similarity between that spectrum and the spectrum of *Nova*. I have now also mounted the spectrum of α *Cygni* for comparison with *Nova*. It is a star of the *Sirian* type, with some exceptionally strong lines. It had already been compared by me with *Nova*, and I revert to it on account of the further resemblance it bears to the bright line spectrum of η *Argûs*.

The spectrum of η *Argûs* was sent me by Sir David Gill from the Cape Observatory in January 1899. He then wrote: "I am sending you by this mail a prism picture of the neighbourhood of η *Argûs*, exposure one hour. The wonderful spectrum near the centre of the field is that of η *Argûs*. There are lots of other bright-line spectra on the plate, as Pickering has already mentioned, but he has apparently no notion what a spectrum η *Argûs* has." This plate was shown in the lantern.

The spectrum of η *Argûs* was enlarged about ten and a half times to the same scale as other enlargements of stellar spectra, so as to be able to compare it with them. On recently comparing it with the spectrum of *Nova Persei*, I found a close correspondence between the bright-line spectrum of η *Argûs* and the absorption spectrum of *Nova Persei*. This correspondence is especially marked from $H\gamma$ to $H\beta$, and the correspondence holds good with the absorption spectrum of α *Cygni*. These three spectra have been mounted together for comparison (plate No. 2 shown at the meeting), and a scale of wave lengths is attached to them.

The absorption spectrum of *Nova Aurigæ* has been plotted to the same scale from the photographs published by Campbell (*Astronomy and Astrophysics*, 1892) and by Frost (*Astronomical Spectroscopy*, 1894). It corresponds closely with the absorption spectrum of *Nova Persei*, and goes to establish the fact that that absorption spectrum is genuine, and not the mere effect of contrast in the spaces between the bright bands. Except the hydrogen bands, the bright line spectrum of *Nova Persei* is difficult to distinguish. To some extent it appears to duplicate the absorption bands, as with *Nova Aurigæ*, and to form a background on which the absorption spectrum is visible.

The spectra of *Nova Normæ* and *Nova Aurigæ* have been compared by Pickering (*Annals of Harvard Observatory*, vol. 26) and found to be "almost identical." It thus appears that the absorption spectra of the three *Novæ*—viz. *Nova Persei*, *Nova Normæ*, and *Nova Aurigæ*—correspond closely with the bright line spectrum of η *Argûs*. It seems possible that the *Novæ* may owe their passing brilliancy to circumstances similar to those

1901MNRAS..61..386M

which give rise to the variable brilliancy of η *Argûs*, although, of course, this is only conjectural.

The correspondence with α *Cygni* furnishes an indication of the origin of these spectra. The spectrum of α *Cygni* differs from that of *Sirius* mainly in the strength of its lines. I have previously (*Comparative Spectra of Stars*, *Phil. Trans.*, vol. 191) attributed the characteristic lines of the Sirian stars to "calcium and titanium rather than to iron, although that spectrum is also present in an incipient form."

April 12, 1901.

Addendum.

Additional photographs of spectrum of *Nova Persei* :—

1901.	Mag.	Photographs	1901.	Mag.	Photograph
April 17	$5\frac{1}{4}$	nil	April 21	6	1
18	$4\frac{1}{4}$	2	22	6	nil
20	6	1	27	$4\frac{3}{4}$	1

April 28, 1901.

The Spectrum of Nova Persei. Note 2.

By Rev. W. Sidgreaves.

The bright hydrogen bands have preserved their general character of strength and breadth throughout the month of March and up to April 4, the date of the last photograph. At the beginning and end of March they were well marked by fine central reversals ; in the middle of March they were crossed by two, and in some cases three, lines of greater brightness ; and on April 4 Hζ showed a line of very pronounced maximum strength to the violet side of its wave-length centre.

The dark hydrogen lines showed their comparatively narrow width on March 7, when the bright bands had paled enough to unmask the red side margins of their dark companions. On March 12 the dark lines were well defined doubles, with the violet side components weaker. On the 21st and 22nd the weaker components were lost, and the series became one of very fine single lines. After the 22nd no sign of the dark series has appeared on the plates.

The relative displacement of the two series is very great ; and, apart from direct comparison with the hydrogen tube, it is possible to say, with great probability, that the source of the hydrogen bright bands is comparatively stationary, and that the source of the dark lines, if their displacements are to be